



299-E33-67 (A6875)

Log Data Report (REVISED)

Borehole Information:

Borehole: 299-E33-67 (A6875)		Site: 216-B-8 Crib			
Coordinates		GWL (ft)¹: n/a ²		GWL Date: n/a	
North (m) 573778	East (m) 137462	Drill Date Dec. 1947	TOC³ Elevation 637.71 ft	Total Depth (ft) 150	Type Cable tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel Welded	2.4	8 5/8	8	0.3125	0	150

Borehole Notes:

This borehole was swabbed before collecting data; no water or contamination were detected inside the casing. The logging engineer measured the pipe stickup at the borehole using a steel tape. Calipers were used to measure casing outer diameter and thickness only; the casing inside diameter is calculated. Stickup was measured between survey points marked on the casing. The drilling depth and casing depth are derived from *Hanford Wells* (Chamness and Merz 1993). Coordinates and TOC elevation are derived from HWIS⁴.

Logging Equipment Information:

Logging System: Gamma 2B	Type: SGLS (35%)
Calibration Date: 09/00	Calibration Reference: GJO-2001-245-TAR
	Logging Procedure: MAC-HGLP 1.6.5
Logging System: Gamma 1C	Type: HRLS
Calibration Date: 02/02	Calibration Reference: GJO-2002-309-TAR
	Logging Procedure: MAC-HGLP 1.6.5

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5
Date	09/17/01	09/18/01	09/17/01		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	2.5	153.0	94.5		
Finish Depth (ft)	28.0	94.0	26.5		
Count Time (sec)	100	100	30		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	0.5	0.5	0.5		
ft/min	n/a	n/a	n/a		
Pre-Verification	B0052CAB	B0054CAB	B0054CAB		
Start File	B0053000	B0054000	B0054119		

Log Run	1	2	3	4	5
Finish File	B0053051	B0054118	B0054255		
Post-Verification	B0053CAA	B0054CAA	B0054CAA		
Depth Return Error (ft)	0	n/a	0		

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2	3	4	
Date	03/04/02	03/05/02	03/05/02	03/06/02	
Logging Engineer	Kos	Kos	Kos	Kos	
Start Depth (ft)	26.0	31.0	53.0	71.0	
Finish Depth (ft)	32.0	52.5	72.0	97.0	
Count Time (sec)	300	150	300	300	
Live/Real	L	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	n/a	n/a	n/a	n/a	
Pre-Verification	D0018CAB	D0020CAB	D0020CAB	D0021CAB	
Start File	D0019000	D0020000	D0020044	D0021000	
Finish File	D0019012	D0020043	D0020082	D0021052	
Post-Verification	D0019CAA	D0020CAA	D0020CAA	D0021CAA	
Depth Return Error (ft)	0.0	n/a	-1.0	-2.1	

Logging Operation Notes:

SGLS and HRLS logging were performed in this borehole during September 2001 and March 2002, respectively. The reference depth for logging measurements is the top of casing. Data were collected during log run 2 at counting times of 150 seconds rather than the usual 300 seconds to reduce logging time in the borehole. The count rates in this depth interval of highest gamma flux were sufficient to provide statistically meaningful data without compromising data quality.

Analysis Notes:

Analyst:	SS/PH	Date:	03/19/02	Reference:	MAC-VZCP 1.7.9, Rev. 2
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This Log Data Report is a revision of the report originally issued 10/11/01. This revision includes high rate data analysis results that were not previously reported and replaces the original Log Data Report.

Pre-run and post-run verification spectra for the SGLS were evaluated. All of the spectra were within the control limits. The post-survey verification (file B0053CAA) was outside of the warning limits. The photopeak counts per second for the 1461-keV peak and the 609-keV peak were below the lower warning limits for this post-run verification spectrum. The HRLS also passed acceptance criteria. A casing correction for 0.3125-in. (5/16-in.)-thick casing was applied to the log data during processing.

Individual spectra were processed in batch mode using APTEC Supervisor. Concentrations were calculated in EXCEL, using an efficiency function and correction for casing established during calibrations of the logging systems. EXCEL templates named G2bSep00.xls and G1cFeb02.xls were used to process the SGLS and HRLS data, respectively. Dead time corrections are applied to log data, including the total gamma data, where the dead time is in excess of 10.5 percent. In zones of high dead time (> 40%), gross count rates and radionuclide concentrations become increasingly less reliable, and may be significantly higher than reported. The HRLS is used in zones of high SGLS dead time to quantify the ^{137}Cs concentrations. The ^{214}Bi peak at 1764 keV is used to determine the naturally occurring ^{238}U concentrations rather than the ^{214}Bi peak at 609 keV. The 609-keV energy peak cannot be distinguished as a result of interference from the ^{137}Cs peak at 662 keV in higher concentration zones.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (^{137}Cs), naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th [KUT]), and a combination of man-made, KUT, total gamma, and dead time. Data collected with the HRLS are substituted for SGLS data where appropriate to provide a continuous record of ^{137}Cs concentrations and total gamma. The total gamma count rates of the SGLS and HRLS cannot be compared directly but the HRLS data completes the general profile in areas where the SGLS did not collect data.

For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable activity (MDA) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction.

Results and Interpretations:

A zone of ^{137}Cs contamination was detected near the ground surface (log depth 2.5 through 9.0 ft) with activities ranging from 0.2 to 129 pCi/g. A second zone of ^{137}Cs occurred between 25.5 and 127.5 ft. The highest concentrations occur between 29 and 95 ft where the SGLS dead times exceed 40 percent. The HRLS data are substituted for the SGLS data in this depth interval. A maximum concentration of about 150,000 pCi/g was measured at 35 ft in depth. ^{137}Cs was detected at the bottom of the borehole at the 152.5 to 153-ft log depth with activities of 0.3 and 0.6 pCi/g, respectively.

A photopeak at 1408 keV was observed at 127.0 ft (file B0054052). Net gamma activity at this peak does not appear to be consistent with ^{238}U (^{214}Bi), as compared to the 609 and 1764 photopeaks. A possible candidate is ^{152}Eu . However, confirming peaks at 121.78 and 344.28 keV were not detected, and ^{154}Eu (1274 keV) was not detected.

Above the zone of intense gamma-ray activity, apparent ^{40}K activities are about 12 pCi/g. Below this zone of intense gamma-ray activity, apparent ^{40}K activities are about 17 pCi/g. The relatively high concentrations of ^{137}Cs below about 27 ft may correspond with the increase in ^{40}K activities and the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, prepared by Pacific Northwest Laboratory for the U.S. Department of Energy.

¹ GWL – groundwater level

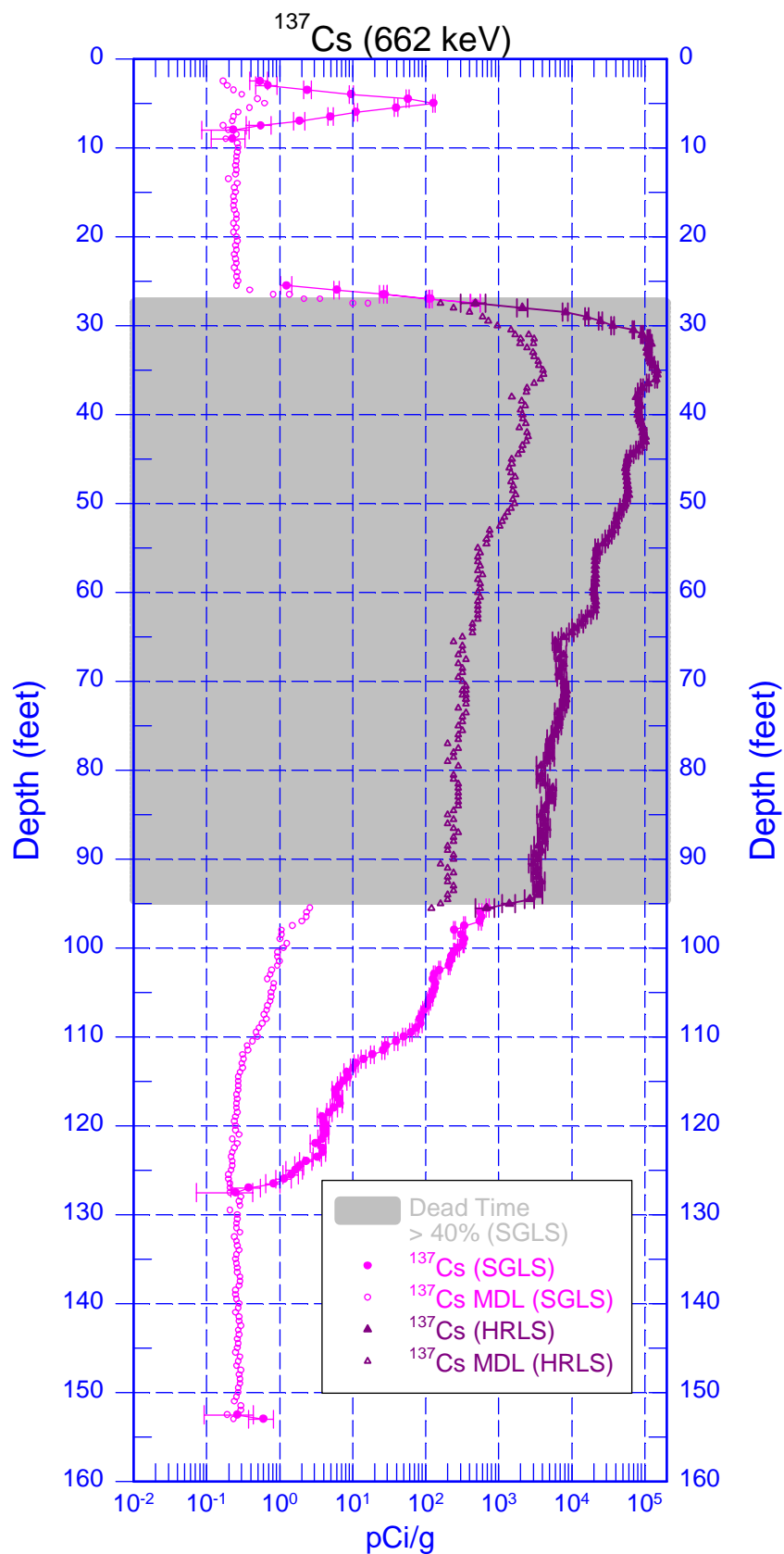
² n/a – not applicable

³ TOC – top of casing

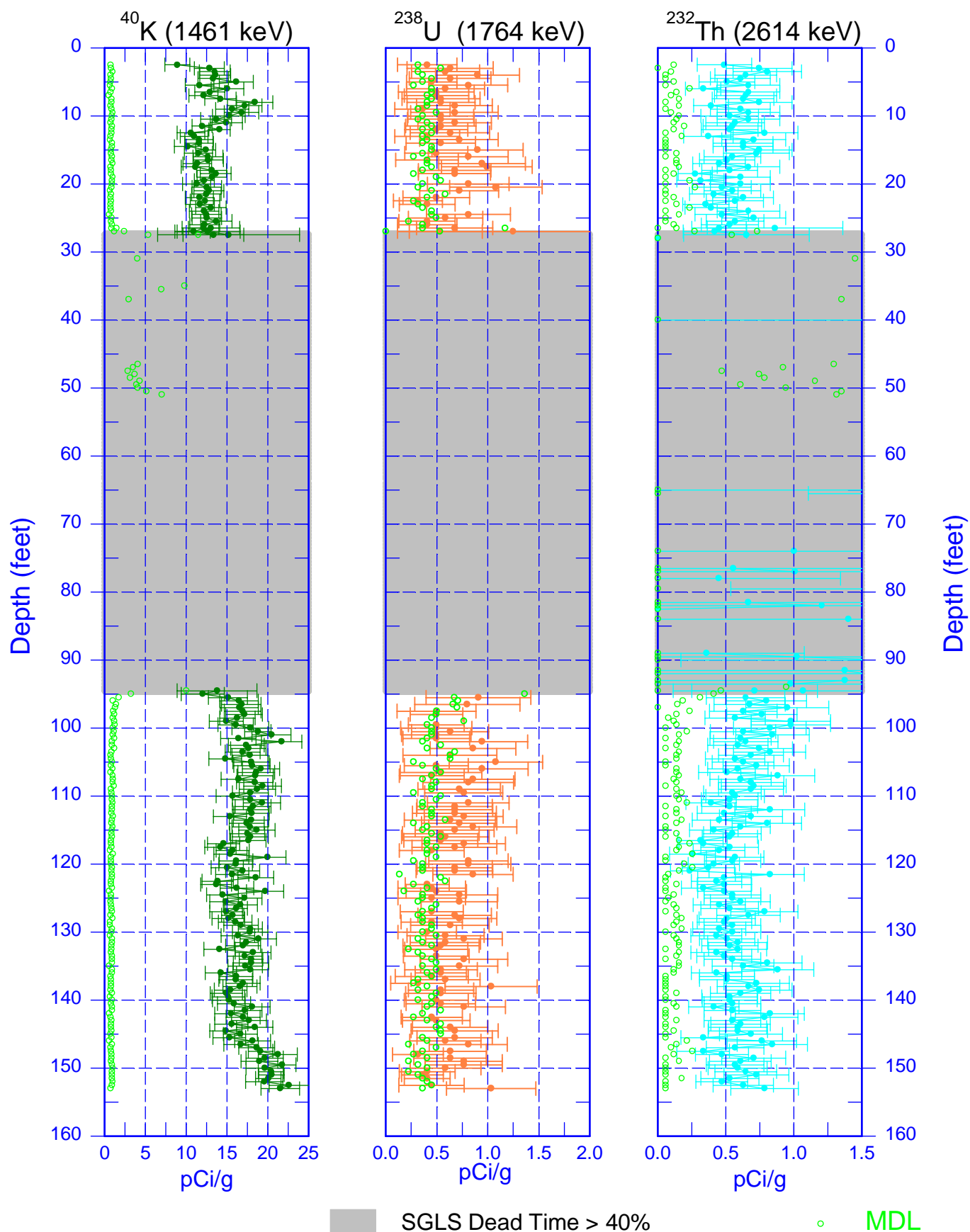
⁴ HWIS – Hanford Well Information System

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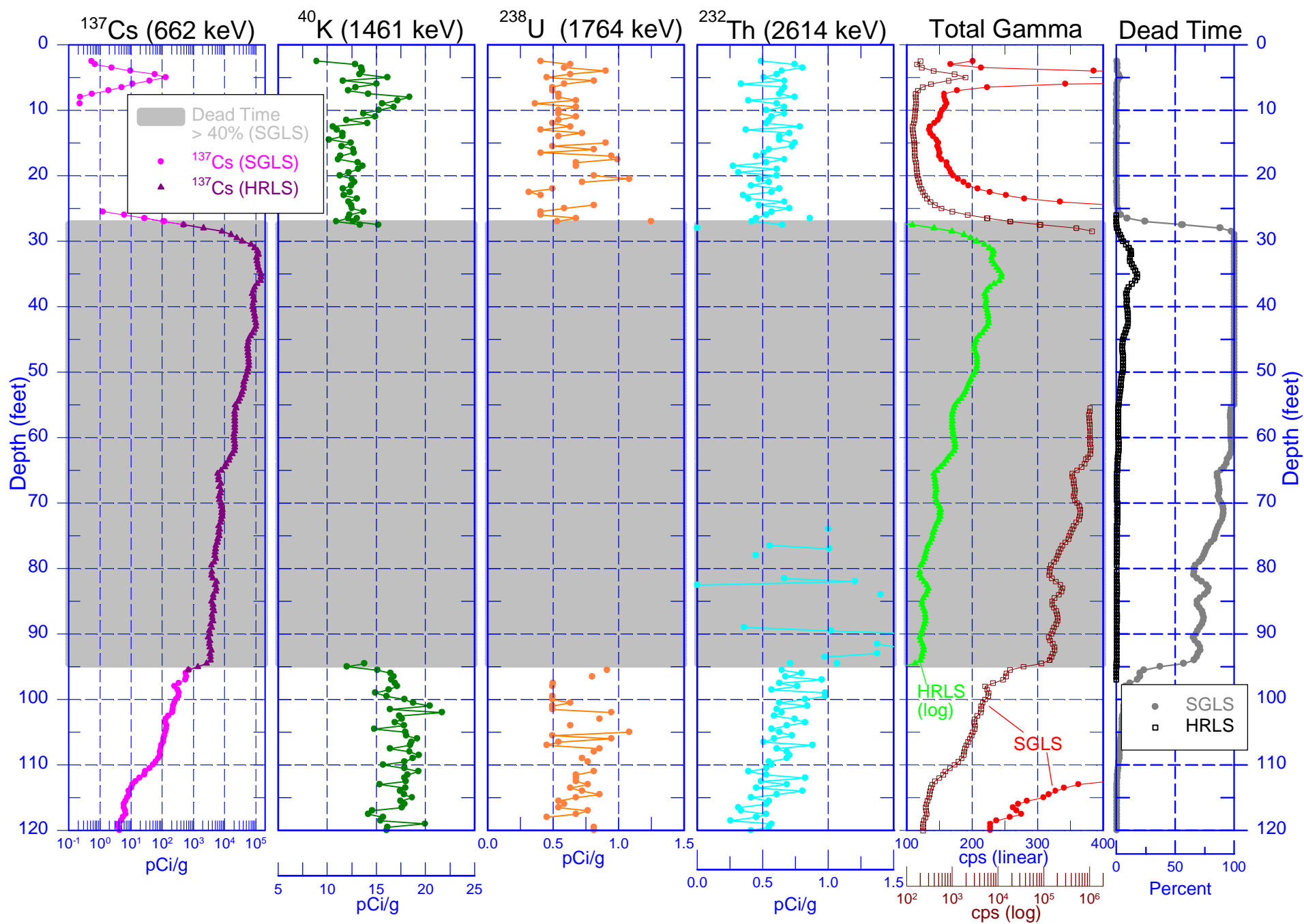
Man-Made Radionuclides



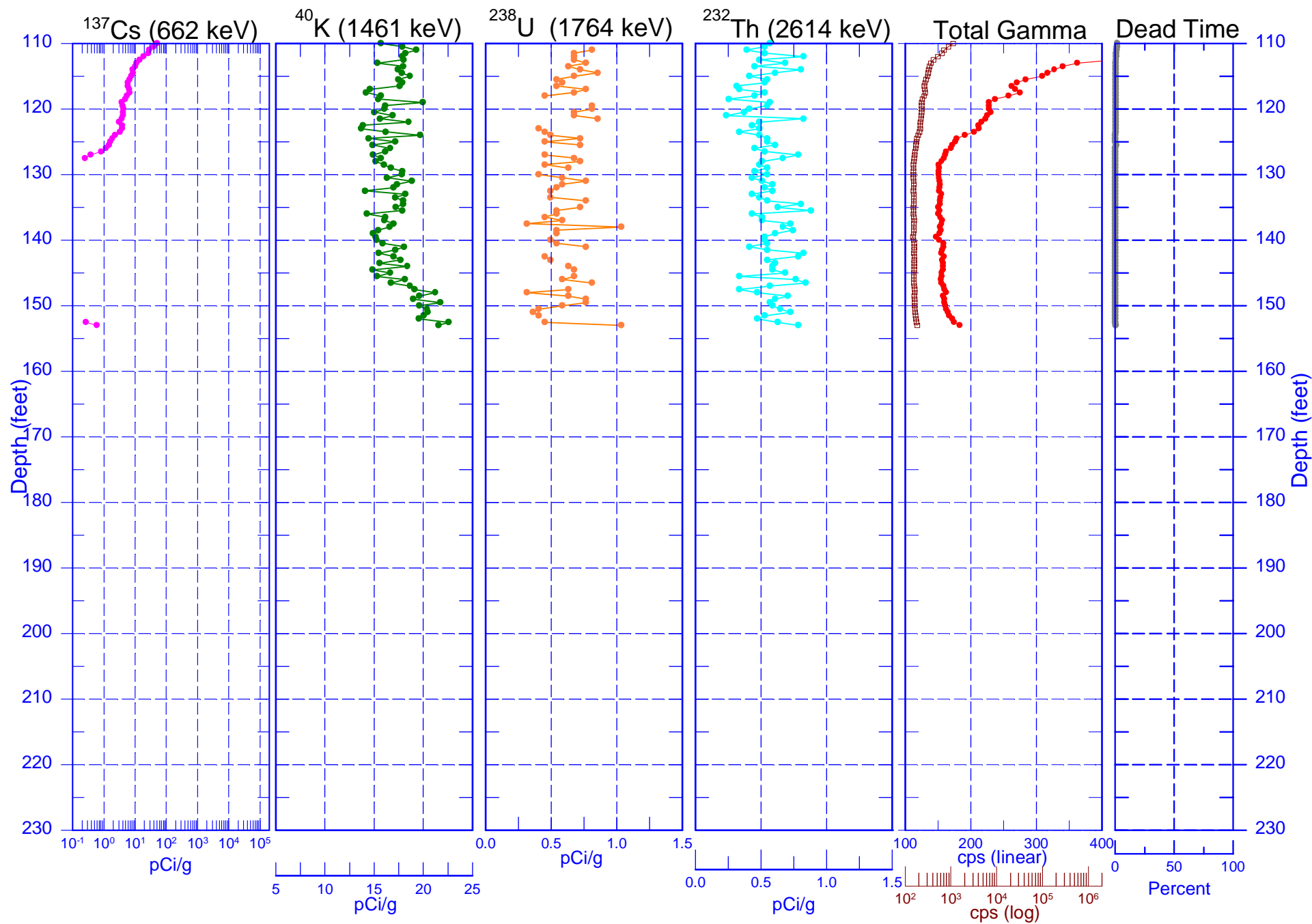
299-E33-67 (A6875) Natural Gamma Logs



299-E33-67 (A6875) Combination Plot



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Total Gamma & Dead Time

